

PTILAGROSTIS LUQUENSIS (POACEAE: POOIDEAE: STIPEAE:  
STIPINAE), A NEW SPECIES FROM CHINA

Paul M. Peterson  
and Robert J. Soreng

Department of Botany  
National Museum of Natural History  
Smithsonian Institution  
Washington, DC 20013-7012, U.S.A.  
peterson@si.edu; sorengr@si.edu

Zhen-Lan Wu

Northwest Plateau Institute of Biology  
Chinese Academy of Sciences  
59 Xiguan Street  
Xining 810001, Qinghai  
PEOPLE'S REPUBLIC OF CHINA

ABSTRACT

*Ptilagrostis luquensis* P.M. Peterson, Soreng & Z.L. Wu from the People's Republic of China is described and illustrated. The new species was found in dense thatch, mollisol soils on nearly level grassy plains surrounded by low hills in Gansu Province. *Ptilagrostis luquensis* is morphologically similar to *P. dichotoma* but differs by having glabrous anthers (1–1.4 mm long), shorter spikelets (2.6–3.5 mm long), shorter glumes (2.6–3.5 mm long), shorter lemmas (2.2–2.7 mm long), shorter and narrower panicles (2–5.2 × 1–3 cm), and lower nodes with 1 or 2 sheathing lanceolate hyaline bracts (1–5 mm long) on the culm inserted immediately below the lowest branches. A key to the species of *Ptilagrostis* in China is provided.

摘要 (CHINESE ABSTRACT)

本文描述了来自中国的一新种短花细柄茅 *Ptilagrostis luquensis* P.M. Peterson, Soreng & Z.L. Wu。该新种采自甘肃省碌曲县，生长在山间草地的密集草丛中。短花细柄茅 *Ptilagrostis luquensis* 与双叉细柄茅 *P. dichotoma* 在形態上相似，但区别在于光滑的花藥，长1–1.4毫米，短的小穗，长2.6–3.5毫米，短的颖，长2.6–3.5毫米，短的外稃，长2.2–2.7毫米，短而狭窄的圆锥花序，长2–5.2厘米，宽1–3厘米，在秆上紧接最下部分枝处具1或2枚鞘状的、披针形、透明的苞片，长1–5毫米。本文同时作出细柄茅属的分种检索表。

*Ptilagrostis* Griseb. is characterized as having chartaceous lemmas with awns that are geniculate and plumose throughout their length, lemma apices with two lobes or teeth, non-overlapping lemma margins, an obtuse callus ( $\leq 6$  mm long), caryopses with non-glossy surfaces, and shoots arising intravaginally (Barkworth 1983; Freitag 1985; Lomonosova 2001; Tzvelev 1983, 2001). There has been much controversy over the interpretation of the taxonomic status and generic limits among species of *Achnatherum* P. Beauv. (syn. *Lasiagrostis* Link), *Ptilagrostis*, and *Stipa* L. *Achnatherum* can be separated from *Ptilagrostis* by having lemmas with awns that are scabrous at least in the terminal portion. *Stipa* generally has florets with a sharp-pointed cylindrical callus ( $\geq 0.7$  mm long) and lemmas that have completely overlapping margins (Tzvelev 1983, 2001). There are approximately 11 species of *Ptilagrostis* currently recognized worldwide and the following six species are treated in the Chinese Floras: *P. concinna* (Hook. f.) Roshev., *P. dichotoma* Keng ex Tzvelev, *P. junatovii*, Grubov,

*mongholica* (Turcz. ex Trin.) Griseb., *P. pelliottii* (Danguy) Grubov, and *P. yadongensis* Keng f. & J.S. Tang (Cui 1996; Keng 1965; Lu 1987; Lu & Kuo 1987; Qian 2002; Wu & Phillips, In prep.). In addition to these six species the following three species, described from outside China, have been reported in China and adjacent regions: *Ptilagrostis alpina* (F. Schmidt) Sipliv. from northeastern China (Liaoning), Japan, and Russia (Eastern Siberia and Far East); *P. malyschevii* Tzvelev from Xinjiang (Tien Shan), Kazakhstan, Kyrgyzstan, Tajikistan (Tien Shan and central Pamirs); and *P. schischkinii* (Tzvelev) Czer. (= *P. concinna* subsp. *schischkinii* Tzvelev) from Xinjiang (Tien Shan and Pamirs), Kazakhstan, Kyrgyzstan (Tien Shan) [Lomonosova 2001; Probatova 2003; Tzvelev 1983].

While collecting grasses on an extended trip to China in 1997 RJS and PMP found this small *Ptilagrostis* and were unsuccessful finding other specimens with similar morphological features while reviewing specimens at KUN and PE. Recently, RJS sent Soreng, Peterson & Sun 5383 to Sylvia Phillips at Kew who was preparing (with Wu Zhen-Lan) the treatment of *Ptilagrostis* for the Flora of China. We conclude this specimen represents an undescribed species. The new species is clearly a member of the subtribe Stipinae, tribe Stipeae, and subfamily Pooideae (Soreng et al. 2003, 2004).

***Ptilagrostis luquensis*** P.M. Peterson, Soreng & Z.L. Wu, sp. nov. (Fig. 1). TYPE: CHINA.

GANSU PROVINCE. Luqu Co. Ca. 30–40 km N of Gansu/Sichuan border on road from Chengdu to Lanzhou, ca. 20 km S of Waxu and 10 Km E of Gahai, ca. 230 km SSW of Lanzhou at kilometer post 394 [34°24'N-102°17'E (corrected from original estimate)]. 3440 m, 18 Sep 1997. R.J. Soreng, P.M. Peterson & H. Sun 5383 (HOLOTYPE: US!, ISOTYPES: HNWP!, K!, KUN!, MO!, PE!).

*A Ptilagrostis dichotoma* Keng ex Tzvelev antheris apice glabris 1–1.4 mm longis, spiculis 2.6–3.5 mm longis, glumis 2.6–3.5 mm longis, lemmatibus 2.2–2.7 mm longis, paniculis 2–5.2 cm longis 1–3 cm latis apertis, nodis inferioribus (1)2 lanceolatis hyalinis bracteis 1–5 mm longis differt.

Caespitose perennial with intravaginal shoot initiation; roots 0.2–0.3 mm diameter. Culms 5–23 cm tall, 0.5–0.8 mm diameter near base, erect, smooth, glabrous, 1-noded, nodes basal, not visible. Sheaths (0.5–)2–8 cm long, shorter than the internodes, glabrous, smooth, the old sheaths forming tight clusters at base; margins hyaline near summit, often excurrent. Blades 2–6 cm long, 0.2–0.5 mm wide, involute, filiform, glabrous, abaxially smooth or scaberulous along keel; margins scabrous; flag blades 1–2 cm long. Ligules 0.4–1.2 mm long, hyaline, purplish to brownish below; apex truncate, obtuse or retuse, usually ciliate, the cilia ca. 0.1 mm long; flag ligules 0.7–1.2 mm long. Panicles 2–5.2 cm long, 1–3 cm wide, open, exerted with 10–15 spikelets; lowest internodes 0.9–1.7 mm long; branches 0.7–2.8 cm long, capillary, loosely ascending to sinuous, spreading 10–50° from the culm axis, smooth, glabrous, purplish; lower nodes usually with 1 or 2 sheathing linear-lanceolate hyaline bracts 1–5 mm long on the culm inserted immediately below the lowest branches, the lowest node with (1)2 branches, each branch often twined or immediately re-branched at the base on the lower nodes; pulvini inflated, smooth, glabrous, present at all branching

*[Faint, illegible text, possibly bleed-through from the reverse side of the page]*

points. Spikelets 2.6–3.5 mm long, 1-flowered; pedicels 3–12 mm long, mostly longer than the spikelets, smooth, glabrous or with a few scattered hairs. Glumes 2.6–3.5 mm long, oblanceolate to elliptic-oblong, subequal, longer than the floret, glabrous and smooth below, whitish with the base purplish; apex obtuse, usually erose and ciliate; lower glume faintly 1–3-veined, slightly broader than the upper; upper glume faintly 3–5-veined. Floret callus short, obtuse, shortly bearded, the white hairs 0.5–1 mm long. Lemmas 2.2–2.7 mm long, lanceolate, chartaceous, terete, 5-veined, awned, scattered pilose on lower 1/4–1/3, the hairs 0.2–0.6 mm long, smooth in the middle, densely scaberulous above; apex acute with lateral triangular lobes ca. 0.6 mm long; awn 6–10 mm long, 1-geniculate, column twisted, sometimes sinuous above, plumose with hairs 1.2–2 mm long throughout, the hairs slightly shorter near apex. Paleas 2.2–2.7 mm long, slightly shorter or equal to the lemma, not overlapped by the lemma margins, distinctly 2-veined, with a few hairs below, scaberulous along the nerves above; apex acute. Stamens 3, anthers 1–1.4 mm long, yellowish; apex glabrous. Lodicules 3, obovate, unequal; abaxial lodicules ca. 0.7 mm long; adaxial lodicule ca. 1 mm long. Ovary 0.5–1 mm long, glabrous; styles 2, separate; stigmas 2 feathery. Caryopses 1.6–1.9 mm long, fusiform, terete, minutely-beaked, grayish, translucent; hilum linear nearly as long as the grain; embryo ca. 1/4 as long as the grain.

*Phenology*.—Flowering in August through September.

*Distribution*.—*Ptilagrostis luquensis* is known from Gansu, Qinghai, Xizang, and Sichuan Provinces between 3350–4800 m. At the type locality the new species was found in dense thatch, mollisol soils on nearly level grassy plains surrounded by low hills, associated with *Poa*, *Calamagrostis*, and *Koeleria*.

*Etymology*.—The specific epithet 'luquensis' is given to this species since the type was found growing in this county.

Additional specimens examined (PARATYPES). **CHINA. Qinghai**: Maduo, 4600m, 7 Jul 1980, Y.H. Wu 1108 (HNWP), Qumalai, 4400m, 8 Aug 1966, S.W. Liu 00765 (HNWP); Zhiduo, 4700m, 15 Aug 1966, L.H. Zhou 322 (HNWP). **Xizang**: Zhongba, 4800m, 14 Aug 1975, Qinghai-Xizang Exped. 6758 (HNWP). **Sichuan**: Ruogai, 3350 m, Jul 1975, Sichuan Exped. 10225 (HNWP).

#### DISCUSSION

Species delimitation within *Ptilagrostis* is problematical and authors have had difficulty differentiating *P. mongholica*, *P. dichotoma*, and *P. concinna*. Noltie (2000) and Cope (1982) may have misapplied *P. mongholica* (treated as *Stipa mongholica* Turcz. ex Trin.) for *P. dichotoma*. Their descriptions include small-flowered (lemmas 3.7–5.5 mm long) and short-awned (12–30 mm long) with short hairs (0.75–2 mm long) forms. Wu & Phillips (In prep.) placed *P. tibetica* (Mez) Tzvelev, a form with lemmas hairy throughout, as a synonym of *P. mongholica*. Noltie (2000) also reduced *P. concinna* (*Stipa concinna* Hook.f.) to a synonym of *P. mongholica*.

*Ptilagrostis schischkini* is morphologically similar with *P. luquensis* since it is a diminutive plant with glabrous anthers. However, from Roshevitz (1963)

description, the spikelets are 5–7 mm long (verses 2.6–3.5 mm) and the lemmas are 3–5 mm long (verses 2.2–2.7 mm). *Ptilagrostis concinna* sensu stricto, is more southern in its distribution (type from Sikkim Himalaya) and differs from *P. luquensis* by having longer glumes (4–6.3 mm), longer lemmas (3.5–5 mm), and longer anthers (1.5–2.2 mm) with a tuft of hairs at the apex. *Ptilagrostis mongholica* subsp. *minutiflora* (V.S. Titov ex Roshev.) Tzvelev [= *P. minutiflora* (V.S. Titov ex Roshv.) Czer.] is another small form from Central Siberia that has small spikelets 4.5–5 mm long and lemmas 3.3–4 mm long with awns 15–20 mm long (versus 6–10 mm in *P. luquensis*) [Tzvelev 1983].

*Ptilagrostis alpina* is another species with small spikelets (3.6–4.5 mm long) and short culms (15–35 cm tall). However, it differs from *P. luquensis* by having scabrous panicle branches, hairy anthers, and longer lemma awns [15–20 (–30) mm long].

Much confusion has also surrounded the use of *Ptilagrostis dichotoma* var. *roshevitsiana* Tzvelev since this too has small spikelets 3.2–4 mm long. However, Tzvelev (2001) indicates that the panicles have dense, short hairs (spinules) on the branches (glabrous in *P. luquensis*), the anthers are hairy, and the plants are large. It is possible that *P. alpina* and *P. dichotoma* var. *roshevitsiana* represent the same entity since both have small spikelets, scabrous panicles, and hairy anthers. The illustration in Lu and Kuo (1987) of *P. dichotoma* var. *roshevitsiana* shows the anthers as having tufts of hairs at the apex. A specimen at Kew (Y.L. Keng & Keng f. 5468 from Qinghai Province, Hūang-yuan Hsien, Harakatur) is problematical since it has glabrous anthers and smooth panicle branches but otherwise seems to match the description of *P. dichotoma* var. *roshevitsiana*. Since this specimen does not have short hairs (spinules) on the panicle branches and does not have inflated pulvini, i.e., it has contracted panicles, we think it falls within the range of variation of *P. schischkinii* (with glabrous anthers). If the Keng and Keng f. 5468 specimen is included within the range of variation of *P. schischkinii* then one must allow for smaller spikeleted forms ranging from (3.8–)4–7 mm long.

Two herbarium specimens from Qinghai: *P.C. Kuo* 12317 (HNWP) and *P.C. Kuo et al.* 331 (HNWP) are problematical since they both have hairy anthers but otherwise seem to exhibit the morphology of *P. luquensis*. It is possible that only a few genes control the expression of this trait and that these specimens represent different populations of *P. luquensis*. At this time we do not have enough information to make this distinction and prefer to recognize the new species as only having anthers that are glabrous at the apex.

The North American disjunctions, *Ptilagrostis kingii* (Bol.) Barkworth from the Californian Sierra Nevada and *P. porteri* (Rydb.) W.A. Weber [syn. *P. mongholica* subsp. *porteri* (Rydb.) Barkworth] from the central Rocky Mountains in Colorado are the only other two species in this genus. *Ptilagrostis porteri* has open, smooth-branched panicles, larger spikelets (4.5–6 mm long), and gla-

brous anthers, whereas *P. kingii* has contracted, scabrous-branched panicles, smaller spikelets (3.2–4.5 mm long), hairy anthers, and lemmas that are hairy throughout with short-pubescent awns (Barkworth 1983).

A key for separating the new species from all other reported species of *Ptilagrostis* in China follows:

#### KEY TO THE SPECIES OF *PTILAGROSTIS* IN CHINA

1. Lemmas 2.2–2.7 mm long; glumes 2.6–3.5 mm long; anthers 1–1.4 mm long, glabrous at the apex \_\_\_\_\_ ***Ptilagrostis luquensis***
1. Lemmas 3.0–8 mm long, glumes 4–12.5 mm long, anthers 1.3–4 mm long, glabrous or hairy at the apex.
  2. Ligules truncate, ca. 1 mm long, ciliate; leaf blades fairly stiff; glumes lanceolate, sharply acuminate; gravelly and rocky places on desert plains \_\_\_\_\_ ***Ptilagrostis pelliottii***
  2. Ligules oblong or lanceolate, rounded, 0.5–6 mm long, glabrous rarely ciliate; leaf blades softer; glumes elliptic or oblong lanceolate, obtuse to acute; alpine meadows and high hilly steppe.
  3. Panicles contracted, 0.7–2 cm wide; branches 0.3–2.8 cm long, suberect or narrowly ascending.
    4. Spikelets 8–12 mm long; glumes unequal \_\_\_\_\_ ***Ptilagrostis yadongensis***
    4. Spikelets (3.8–)4–7 mm long; glumes subequal.
      5. Anthers glabrous or with a solitary hair at the apex; lemma awns 6–10 mm long \_\_\_\_\_ ***Ptilagrostis schischkinii***
      5. Anthers with a tuft of hairs at the apex; lemma awns 1–2 mm long.
        6. Panicles with sheathing membranous bracts at base of lowest branches; spikelets purple; lemmas 3.5–5 mm long; awns 1–1.5 cm long \_\_\_\_\_ ***Ptilagrostis concinna***
        6. Panicles without membranous bracts at base of lowest branches; spikelets brownish mauve; lemmas 4.5–6 mm long, awns 1.5–2 cm long \_\_\_\_\_ ***Ptilagrostis junatovii***
  3. Panicles open, 3–5 cm wide; branches up to 6 cm long, spreading.
    7. Anthers 1.8–4 mm long, glabrous at the apex \_\_\_\_\_ ***Ptilagrostis mongholica***
    7. Anthers 1–2 mm long, with a tuft of hairs at the apex.
      8. Lemma awns 23–42 mm long; ligules 2.5–6 mm long \_\_\_\_\_ ***Ptilagrostis malyschevii***
      8. Lemma awns 1–20(–30) mm long (if over 20 mm long then branches scabrous); ligules 1–3 mm long.
        9. Panicle branches scabrous; 7–13 spikelets per panicle; plants 15–35 cm tall \_\_\_\_\_ ***Ptilagrostis alpina***
        9. Panicle branches smooth; 15–25 spikelets per panicle; plants 15–50 cm tall \_\_\_\_\_ ***Ptilagrostis dichotoma***

#### ACKNOWLEDGMENTS

We wish to thank curators at the following herbaria for their help: HNWP, K, KUN, PE; and the Smithsonian Institutions, National Museum of Natural History, Biodiversity and Inventory Program for supporting the fieldwork. Appreciation is extended to Alice R. Tangerini for providing the illustration; Alain Touwaide for correcting the Latin diagnosis; Sylvia M. Phillips for providing us

with an annotated copy of her unpublished Flora of China account and key; and SMP and William A. Weber for reviewing the manuscript.

## REFERENCES

- BARKWORTH, M.E. 1983. *Ptilagrostis* in North America and its relationship to other Stipeae (Gramineae). *Syst. Bot.* 8:395–419.
- COPE, T.A. 1982. No. 143 Poaceae. In: E. Nasir and S.I. Ali, eds. *Flora of Pakistan*. Herbarium Royal Botanic Gardens, Kew. Pp. 1–678.
- CUI, D.F. 1996. 47. *Ptilagrostis* Griseb., In: Cui, N.R., ed. *Flora Xinjiangensis*, Tomus 6 Angiospermae Monocotyledoneae. Xinjiang Science & Technology & Hygiene Publishing House, Ürümqi. Pp. 318–321.
- FREITAG, H. 1985. The genus *Stipa* (Gramineae) in southwest and south Asia. *Notes Roy. Bot. Gard. Edinburgh* 43:355–489.
- KENG, Y.L. 1965. *Flora illustrata plantarum primarum Sinicarum: Gramineae*. K'o hsüeh ch'u pan shê, Beijing.
- LOMONOSOVA, M.N. 2001. 57. *Ptilagrostis* Griseb. In: L.I. Malyshev and G.A. Peschkova, eds. *Flora of Siberia*, Volume 2, Poaceae (Gramineae). Science Publishers, Inc., Enfield, New Hampshire. Pp. 226–227.
- LU, S.L. 1987. 72. *Ptilagrostis* Griseb. In: C.Y. Wu, ed. *Flora Xizangica*, Vol. 5. Science Press, Beijing., Pp. 263–268.
- LU, S.L. and P.C. KUO. 1987. 9. *Ptilagrostis* Griseb. In: P.C. Kuo, ed. *Flora Reipublicae Popularis Sinicae*, Tomus 9 Angiospermae Monocotyledoneae, Gramineae (3) Pooideae. Science Press, Beijing. Pp. 310–316.
- NOLTE, H.J. 2000. *Flora of Bhutan*, including a record of plants from Sikkim and Darjeeling, Volume 3, Part 2, The Grasses of Bhutan. The Charlesworth Group, Huddersfield, UK. 456–883 Pp.
- PROBATOVA, N.S. 2003. Genus 63. *Ptilagrostis* Griseb. In: N.N. Tzvelev, ed. *Vascular plants of the Russian Far East*, Volume I, Lycopodiophyta, Juncaceae, Poaceae (Gramineae). Science Publishers, Inc., Enfield, New Hampshire. Pp. 435–436.
- QIAN, J. 2002. 5. *Ptilagrostis* Griseb. In: Editorial committee of *Flora Yunnanica*, eds. *Flora Yunnanica Tomus 9* (Spermatophyta). Science Press, Beijing. Pp. 245–247.
- ROSHEVITS, R.Y. 1963. Order 4. Glumiflorae, Family XXIV. Gramineae Juss. In: R.Y. Roshevits and B.K. Shishkin, eds. *Flora of the U.S.S.R. (Flora SSSR)*, Vol. II. Israel Program for Scientific Translations, Jerusalem. Pp. 1–622.
- SORENG, R.J., P.M. PETERSON, G. DAVIDSE, E.J. JUDZIEWICZ, F.O. ZULOAGA, T.S. FILGUEIRAS, and O. MORRONE. 2003. Catalogue of New World grasses (Poaceae): IV: subfamily Pooideae. *Contr. U.S. Natl. Herb.* 48:1–730.
- SORENG, R.J., G. DAVIDSE, P.M. PETERSON, F.O. ZULOAGA, E.J. JUDZIEWICZ, T.S. FILGUEIRAS, and O. MORRONE. 2004. Catalogue of New World grasses (Poaceae). [mobot.mobot.org/W3T/Search/nwgc.html](http://mobot.mobot.org/W3T/Search/nwgc.html) and classification of New World Grasses. [mobot.mobot.org/W3T/Search/nwgc.class.html](http://mobot.mobot.org/W3T/Search/nwgc.class.html)

- TSVELEV, N.N. 1983. Grasses of the Soviet Union (Zlaki SSSR), Parts 1 & 2. In: A.A. Fedorov, ed. Akademiya Nauk SSSR, Botanicheskii Institut im. V.L. Komarova. Amerind Publishing Co., New Delhi.
- TSVELEV, N.N. 2001. Volume 4, Gramineae (grasses). In: V.I. Grubov, ed. Plants of Central Asia, plant collections from China and Mongolia. Science Publishers, Inc., Enfield, New Hampshire.
- Wu, Z.L. and S.M. PHILLIPS. 200?. *Ptilagrostis*. In: Flora of China Editorial Committee, eds. Flora of China: Poaceae, Volume 22. Missouri Botanical Garden Press, St. Louis. In prep., 4 manuscript pp.